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FACILITY FOR PACKAGING OBJECTS IN A TUBULAR PLASTIC FOIL
[Vorrichtung zum Verpacken von Gegenständen in eine schlauchförmige Kunststoffolie]

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Description

The invention relates to a facility for packaging objects in a tubular plastic foil which is grasped by finger elements which is arranged on a horizontal, vertically movable frame, and spread out in its open position by the finger elements which are mounted on brackets being moved towards each other after the foil section to be processed has been slipped on by means of a slip-on device, whereas the finger elements can be pivoted around a horizontal axis in the cross-section of the opening of the tubular foil, and, whereas driven shafts are provided which can be set against the finger elements to slip the foil on the brackets.

A device for the packaging of objects with a tubular plastic foil in accordance with the preamble of Claim 1 is known to the art from DE-OS 3707877. It essentially consists of a horizontal frame which is movable in vertical direction on a stand, the clear cross-section of which is larger than the maximum cross-section of the object which is to be packaged, of a feed device to feed the plastic foil from a supply roll to the frame, and two brackets which are carried opposite to each other on the frame which can be moved towards and away from each other. To begin with, two finger elements are provided on each of the brackets which reach into the interior of the tubular plastic foil, as well as a slip-on device to slip a preselectable section of the length of the tubular plastic foil on the finger elements. To package an object, a preselected section of the length is slipped on the finger elements by the slip-on device. By moving the brackets apart in the horizontal direction, the plastic foil

is stretched and, at least, deposited on the lateral surfaces of the object by moving the horizontal frame downward. A useful degree of stretch is about 30%, whereas stretches up to 50% are within the possible range. Because the preselected foil section is completely stripped off the finger elements at the end of the downward movement of the horizontal frame, this facility has the disadvantage that a frequently desired vertical stretching of the foil to increase the stability of the packaging is not an option.

Moreover, because, by providing appropriate rounded areas, the finger elements are expediently configured in such a way that the foil will maintain a constant strength in the corners which are grasped by the fingers, it can happen that, gathered up lengths of foil will already slip off the finger elements during the horizontal expansion or stretching.

DE-PS 2604729 describes a machine for the deposition of a band stock of plastic stretch film, in order to package a group of objects. The band stock is cut off a tube over a cutter, transferred to a stretcher via a conveyor unit, and, from there, to another conveyor unit. This additional conveyor unit is assigned a downward-moving frame during the downward movement of which the band stock which is stretched on this group of objects is transferred in horizontal direction and encloses it. In this transfer system, a stretching of the foil does not, however, take place in the vertical direction, which, also, is not desirable because the height of the cut band stock should be the same as when the band stock encloses the objects.

From DE-OS 2440515, a wrapping machine for the packaging of objects with a tubular foil is known to the art. In this process, the tube of foil is conveyed to gathering arm arrangements via a suction band construction which, in turn, are mounted on carriers. To open the tube of foil, the gathering arm arrangements are retracted towards the outside and subsequently lowered over the object to be packaged. An expansion (stretching) of the foil to increase its stability is neither carried out in the vertical nor horizontal direction.

The required stability of the packaging, on the one hand, is the result of the inherent elasticity of the plastic material at the usual ambient temperature. It has been proven that this elasticity is variable depending upon the ambient temperature.

In order to be able to, nevertheless, guarantee the stability of the packaging compound within certain limits, it has, on the one hand, already been proposed that thermal devices be provided at appropriate places of the packaging device through which the temperature of the foil sections required for packaging are brought to a level which is favorable for processing the respective type of foil, and to keep it there, and, on the other hand, it has been proposed that the finger elements exhibit a raised area on the side which faces the foil which would serve the frictional influence as the foil is reeled off. It has, however, become evident that this configuration is not appropriate for all foil types that are used because, either the foil was still stripped off the finger

element due to its tension as a result of exceedingly weak friction, or it tore when the friction was too strong.

The present invention is based on the objective of improving a facility for the packaging of objects in a tubular plastic foil of the above-mentioned kind to the end that the foil is always also flawlessly stretched in the vertical direction regardless of the type of foil which is used.

The above objective is realized through the distinguishing features of the Principal Claim 1.

The provision is that an endless belt is arranged on each finger element. Due to the arrangement of the endless belt, the foil is gathered up in the one rotary direction below the slide-on device while, in the other rotary direction, it is released during the downward movement of the frame in a controlled fashion. This has the particular advantage that the length of foil which is to be gathered up is followed up by the endless belt and unnecessary tears are prevented in this manner. Moreover, the reeling off of the foil during the expansion or stretching process can be controlled better. In an advantageous configuration of the present invention it is further proposed that the endless revolving belt be driven by the shaft, whereas the belt runs in the opposite rotary direction of the shaft. This has the advantage that the gathering of a foil of any kind is substantially improved. Moreover, the lengths of foil which are to be gathered up can be controlled better.

In an additional advantageous configuration of the present invention, the provision is that the shafts are controllable in their rotary direction, their number of revolutions per minute, and their contact pressure during the downward movement of the frame in such a way that the tubular foil which is being released is stretched. As a result, the foil, regardless of the type of foil which is used, can be expanded (stretched) in the vertical direction so far that a fine and consistent stability of the object to be packaged is realized.

In the following description, a configuration example of the invention will be explained in greater depth. In the drawings,

Figure 1 depicts a partially sectioned lateral view of the packaging facility with the finger elements in accordance with the invention,

Figure 2 depicts a schematic lateral view of a finger element in accordance with the invention with a slip-on device, and

Figure 3 depicts a schematic view of the finger element with the slip-on device in accordance with Figure 2 sectioned in the location A-A.

The packaging device shown in Fig. 1 includes a horizontal frame (2) which is carried on a stand (1), so that it is movable in the vertical direction, as indicated by the double arrow (A). Below the frame's opening, the stacked goods which are to be packaged (3) are arranged which are set on a pallet (4). The pallet (4) is packaged together with the goods which are to be packaged (3). The goods to be packaged (3) can be positioned

in their packaging position below the frame's opening by means of a conveyor unit (5) and are transferred on via this conveyor unit (5) after the packaging has been completed. In order to be able to catch under the goods to be packaged (3) and the pallet (4) with the packaging material, the conveyor unit (5) is configured appropriately narrow. Moreover, a lifting device is provided, which is not shown, in order to position the pallet (4) at the desired height, as indicated by the double arrow (C). To improve a vertical rigidity of the packaging, the packaging material is temporarily clamped between the conveyor unit (5) and the pallet (4) of the goods to be packaged (3). A tubular foil (6) serves as the packaging material which is reeled on a supply roll (9) and which, via deflection elements, such as sliding rails and rollers, is fed to a bracket (11) that is horizontally mounted on the upper end of the stand (1), which protrudes towards the front in the same direction as the frame (2). In its folded state, the tubular foil (6) is folded in such a way that it exhibits a border which folds to the inside on each side and two edges which point towards the outside.

Additional guide facilities and devices to cut off and, possibly, heat-seal the tubular foil in the transverse direction within the bracket (11) are not shown.

A hot air blower (8) is provided at the upper feed device (7). The foil which is conveyed past the blower (8) is comparatively heated strongly in the proximity of the blower and cools off near the front end of the feed device (7). Due to the hot air which is evenly distributed in the

feeding direction (7) and acts upon the top and bottom sides of the foil, the entire foil section is brought to the desired temperature level and kept there.

Two brackets (12, 13) which are parallel to the frame parts and in relation to each other are arranged on the frame (2). The two brackets (12, 13) can be moved towards and away from each other, as indicated by the double arrows (B), as well as vertically, as is generally known to the art. Each of the brackets carries two suction boxes which are not shown which contain suction ventilators which are not shown in any detail. A pivotable finger element (14) is carried on each of the suction boxes which can be pivoted out of a horizontal non-utilitarian position with its free end towards the inside of the frame's openings into a functional position which vertically points upward. The four finger elements (14) can be driven towards the outside by appropriate movements of the brackets (12, 13) or of the suction boxes in a horizontal (x and z) direction in a manner which is generally known to the art, in order to completely open the tubular foil, and in order to realize a horizontal expansion or stretching of the foil, so that the foil's cross-section is somewhat larger than the cross-section of the object which is to be packaged. Hot air blowers (10a, 10b) are provided below the plane of the finger elements (14) on the bottom side of the brackets (12, 13) which blow hot air into the inside of the tubular foil. Through this arrangement of the hot air blower (10a, 10b), the vertical expansion or stretching behavior of the

foil is also affected particularly favorably. Switches and adjustment regulators for the respective blowers are located on the control panel.

Figure 2 depicts the specific configuration of the finger element (14) in accordance with the invention. The finger element is carried in the brackets, so that it is rotatable around the axis (16, 17) by 90° from the horizontal standby position into the vertical functional position. All edges are rounded off, and, to facilitate an improved unreeling of the foil in upward direction, the upper edge is worked out in the form of a bent cylindrical brace (15).

In the depicted configuration example, the base (18) is configured in the form of an endless revolving belt which is run on the finger element. This endless revolving belt is driven by the horizontal shaft (19) and, thus, runs in the opposite rotary direction to the movement of the shaft. A foil which is slipped on the finger element (14) via the brace (15) is guided in downward direction by the belt and guided on between the shaft and the belt. Below this place of contact, the foil is gathered up as appropriate.

In Fig. 3, the belt (18) and the shaft (19) can be seen from the top, whereas it should be noted that the belt (18) is configured somewhat narrower than the shaft (19), whereby it is guaranteed that the foil will not be torn open on sharp edges on the corner that is held by the finger element (14).

Because either the shaft (19) or the belt (18), or both, can be appropriately coated depending upon the desired friction properties, an

optimal gathering of the required foil section is guaranteed. The lengths of foil to be gathered are fed to the line of contact between the shaft and the endless belt by the endless belt, so that the foil is not unnecessarily pulled. In the case in which the foil is reeled off, this can occur very controlled because the contact pressure of the shaft against the base which is rotatable in the opposite direction can be controlled with means that are generally known to the art. In sum, through this arrangement, the entire packaging facility becomes independent of the type of foil that is used.

Patent Claims

1. Facility for packaging objects in a tubular plastic foil which is grasped by finger elements which are arranged on a horizontal, vertically movable frame, and spread into its open position by moving apart the finger elements which are mounted on brackets after the foil sections to be processed have been slipped on by means of a slip-on device, whereas the finger elements (14) can be pivoted into the cross-section of the tubular foil's (6) opening around a horizontal axis (17), and, whereas, to slip on the foil, driven shafts (19) are provided on the brackets (12, 13) which can be set against the finger elements, characterized in that an endless revolving belt (18) is provided on each finger element (14), so that, in a controlled fashion, the foil is gathered up in the one rotary direction below the slip-on device, and released in the other rotary direction during the downward movement of the frame (2).

2. Facility, in accordance with Claim 1, characterized in that the endless revolving belt (18) is driven by the shaft (19).

3. Facility, in accordance with Claim 1, characterized in that the shafts (19) can be controlled in their rotary direction, their number of revolutions per minute, and their contact pressure during the downward movement of the frame (2) in such a way that the released tubular foil (6) is stretched.

Accompanied by 2 page(s) of drawings

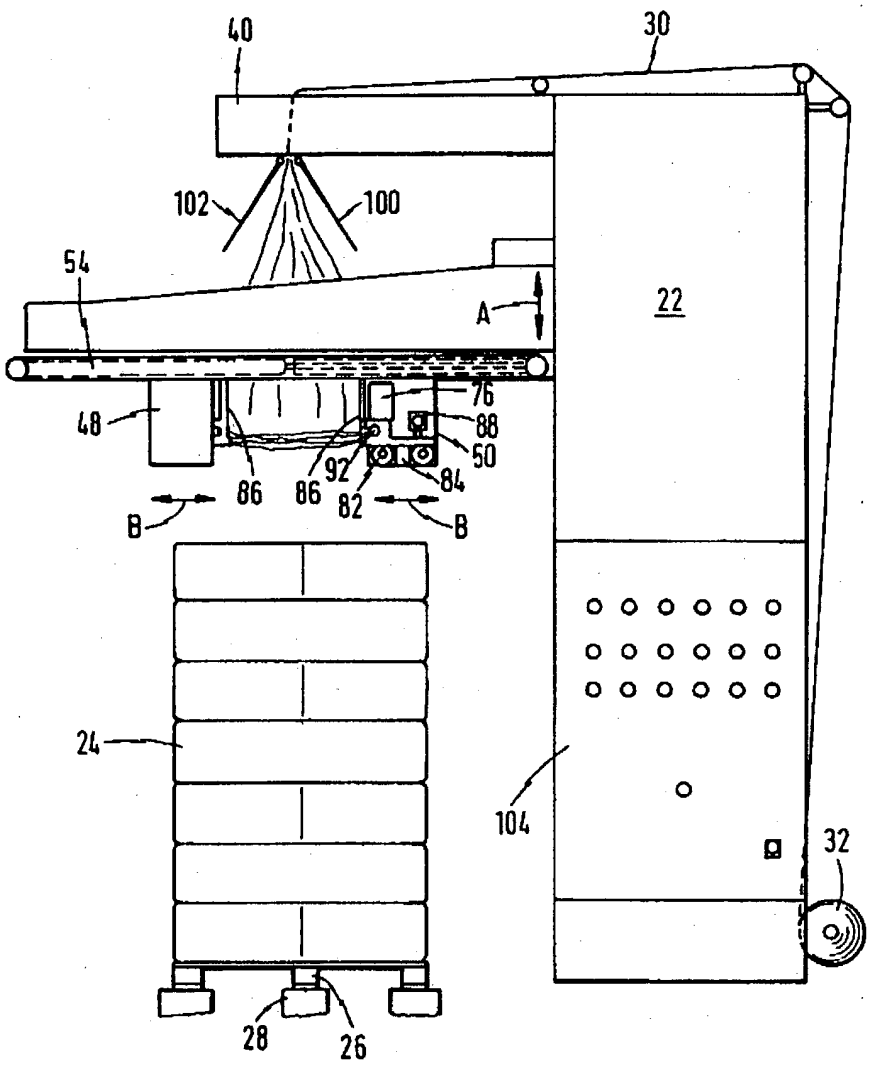

Fig. 1

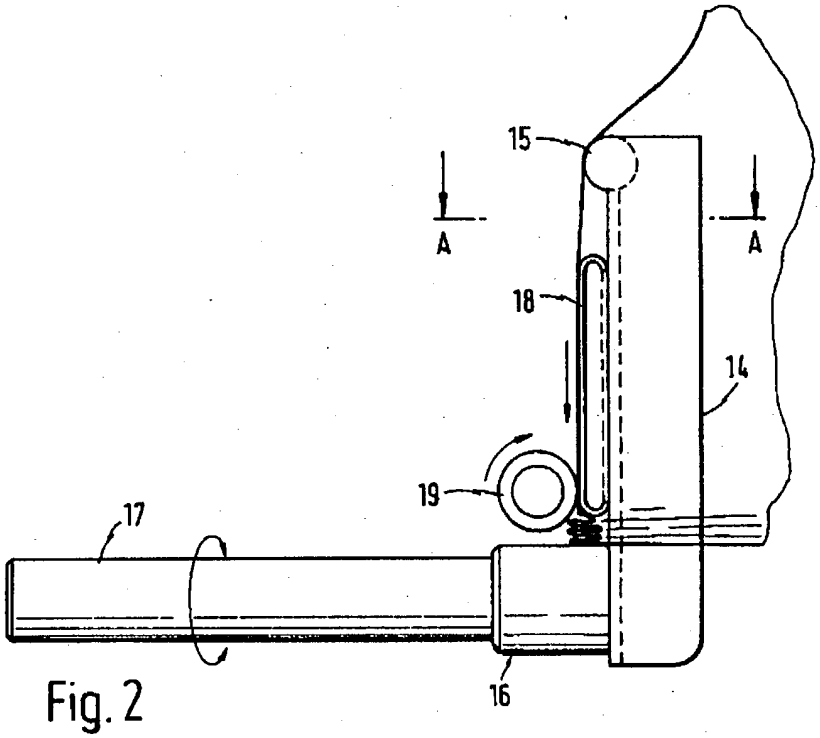

Fig. 2

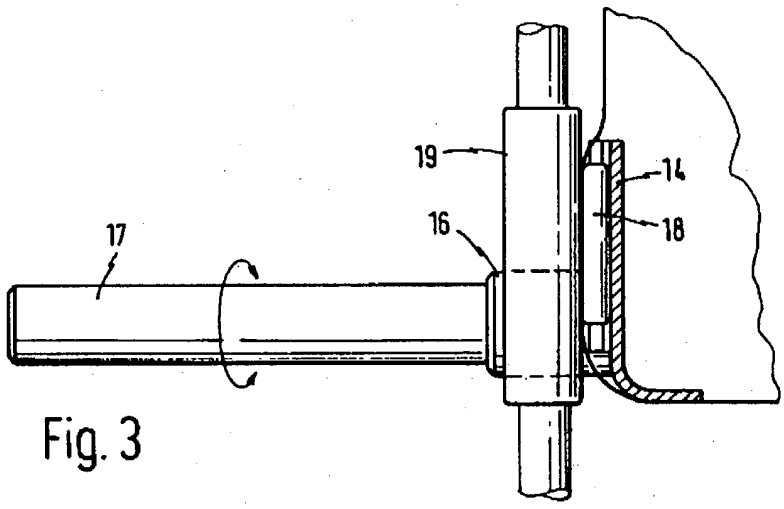

Fig. 3